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3. None of the circles of the F and F' groups pass through either of the fixed points F and F' .

Any circles drawn through F and F' are extraneous to the loci, but each such circle is orthogonal to every circle in the loci groups.

Notes on Fungi: F. L. STEVENS and J. G. HALL, North Carolina Agricultural Experiment Station, West Raleigh, N. C.

Three new species of *Claviceps* were described. Two of them are upon *Paspalum* and are thought to be the perfect stages of the fungus usually known as *Sclerotium Paspali* S. Germination of the sclerotium was described and the characters of the fungus were illustrated by photographs and specimens. The third species grows upon gama grass (*Tripsacum dactyloides* L.). Both sphacelia and ascospore stages were exhibited. Technical descriptions were given under the names *Claviceps Paspali* (S.) n. comb.; *C. Rolfsii* n. sp., and *C. Tripsaci* n. sp. These will be published in full elsewhere soon.

Specimens of a *Cercospora* upon persimmon which was thought to be new were also shown.

Some Methods of Making Illustrations: Z. P. METCALF, Department of Agriculture, Raleigh, N. C.

A brief consideration of some of the more important methods of making illustrations considered from the standpoint of the biologist.

Precautions Necessary in Estimating Climates of Geological Time: COLLIER COBB, University of North Carolina, Chapel Hill, N. C.

The Jaws of the Spotted Sting Ray Aetobatus narinari: E. W. GUDGER, State Normal College, Greensboro, N. C.

This ray and its jaws were described by George Maregrave from a specimen from Brazilian waters in a book published in 1648. Unlike other pavement-toothed rays, this fish has only the central row of teeth, the lateral ones having entirely disappeared. Maregrave correctly counted its fourteen I-shaped upper teeth, and its seventeen broad V-shaped lower ones. The lower jaw is narrower and longer than the upper and projects beyond the lips. With it and the snout the ray digs up the clams which constitute its chief food.

The paper was illustrated with photographs of the fish and with a pair of dried jaws.

The writer has in preparation for the U. S. Bureau of Fisheries, a paper on this ray, reviewing all the work ever done on it, and including his own observations and photographs.

The Coconut Crab: JOHN F. LANNEAU.

Called also the robber crab and the pouch crab. Shaped more like a lobster than a crab. Found on islands of the South Pacific. Weight usually five or six pounds, sometimes twenty. Feeds on fallen cocoanuts. Said to climb the trees. Is highly esteemed as food, especially the rich, fatty content of the pouch. Is found on our island of Guam. It and other singular forms of life on that pleasant little island would repay a biologist's investigation. His visit would likely be facilitated by our Secretary of War or Secretary of Navy.

A Double Flowering Dogwood: F. L. STEVENS and J. G. HALL, North Carolina Agricultural Experiment Station, West Raleigh, N. C.

A case of double flower of the common flowering dogwood (*Cornus florida* L.) due to the excessive development of the small bracts that subtend the individual flowers of the ordinary head was reported. There was as well the suppression of all the individual flowers except the central one, which appeared entirely normal.

A Note in the Development of the Gall-fly Diastrophus nebulosus O. S.: J. D. IVES, Wake Forest College, Wake Forest, N. C.

This paper is published in full in the current number of the *Journal of the Elisha Mitchell Scientific Society*.

Pecan Culture in North Carolina: W. N. HUTT, State Horticulturist, Raleigh, N. C.

E. W. GUDGER,
Secretary

SOCIETIES AND ACADEMIES

THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

THE thirty-ninth meeting was held at the Sheffield Biological Laboratory, New Haven, Conn., on Wednesday, May 18, 1910, at 4:15 P.M., with President Morgan in the chair. An executive meeting was held.

New members elected: A. B. Eisenbrey, H. D. Senior, Edna Steinhardt, H. F. Swift.

Members present: Atkinson, Beebe, Davenport, Gies, Harrison, Henderson, Janeway, Lee, Levin, I., Lusk, MacCallum, Meltzer, Mendel, Morgan, Murlin, Norris, Pearce, Shaklee, Stewart, H. A., Wolf.

Scientific Program

— "An Examination of Fröhlich's Theory of the Treppe," Frederic S. Lee and E. N. Harvey.

"An Attempt to Discover the Cause of the Specific Dynamic Action of Protein," Graham Lusk.

"Demonstration of a Modified Method of Estimating Pepsin," William C. Rose. (By invitation.)

"The Metabolism of the Purines in Man," Lafayette B. Mendel and John F. Lyman.

"A Demonstration of the Method of Phelps and Tillotson for Esterifying the Products of Protein Hydrolysis," T. B. Osborne and L. M. Liddle.

"The Distribution of the Blood in Shock," E. P. Lyon and J. L. Swarts.

"The Fundamental Conditions of Surgical Shock," Yandell Henderson.

"Observations on the Nature of the Antitrypsin of the Serum," R. Weil and L. Feldstein.

"On the Power of Reproduction without Conjugation in Paramecium," Lorande Loss Woodruff.

"Alleged Rhythm in Phototaxis Synchronous with Ocean Tides," Max Withrow Morse.

"Vaso-response in Dogs to Hydrophobia Rabbit Serum," J. P. Atkinson and C. B. Fitzpatrick.

"On the Precipitation of Diphtheria Antitoxin by Precipitins," J. P. Atkinson and Edwin J. Banzhaf.

"Further Observations on the Structure of Anastomosed Blood Vessels," C. C. Guthrie.

"Results of Engrafting Fetuses into Fowls," C. C. Guthrie.

"Factors Influencing the Survival of Engrafted Thyroid Tissues in Fowls," C. C. Guthrie.

"Modification of Tissue Oxidations *in vitro*," F. V. Guthrie. (By invitation.)

"The Development and Function of the Heart in Embryos without Nerves," Davenport Hooker. (By invitation.)

"A Demonstration of the Use of Krogh's Gas Tonometer," M. M. Scarborough. (By invitation.)

"An Experimental Study of the Resistance to Compression of the Arterial Wall," T. C. Jane-way and E. A. Park.

"A Device for Control of Ether and Air or other Gases in Connection with Various Forms of Artificial Respiration," A. O. Shaklee.

"The Chromosomes in the Parthenogenetic and Sexual Eggs of Phylloxerans and Aphids," T. H. Morgan.

"Hybridization in a Mutating Period in *Drosophila*," T. H. Morgan.

"Inflammation in Tissues Isolated from Nervous Connections," W. G. MacCallum.

"Experimental Hypertrophy of the Heart," H. A. Stewart.

"Biological Significance of Sertoli Cells," F. M. Hanes. (By invitation.)

"A Study of Saliva in its Possible Relation to Dental Caries," Alfred P. Lothrop and William J. Gies.

"Studies on Experimental Arterial Lesions in the Dog," Isaac Levin and John H. Larkin.

"The Relation of the Thalamus to Respiration, Blood Pressure and Blood Supply of the Spleen," E. Sachs. (By invitation.)

"The Influence of Oils and Lecithin on Protein Metabolism," Lloyd H. Mills and John R. Murlin.

"Inheritance of Plumage Color in Poultry," Charles B. Davenport.

EUGENE L. OPIE,
Secretary

THE NEW YORK ACADEMY OF SCIENCES
SECTION OF BIOLOGY

A REGULAR meeting of this section was held at the American Museum of Natural History, April 11, 1910, Mr. Roy W. Miner presiding. The following papers were read:

Collecting Invertebrates in the Woods Hole Region: ROY W. MINER.

Mr. Miner gave an account of his collecting experiences during the summer of 1910 in the Woods Hole region. The methods and results of a dredging expedition were first outlined, and then the speaker gave an account of the habits of some of the more interesting and typical invertebrates found in the vicinity of Buzzard Bay and Vineyard Sound, dwelling especially on the Annulata. The address was illustrated with colored lantern slides of the living animals.

Osteology and Genetic Relations of the Menotyphlous Insectivores: W. K. GREGORY. (Read by title.)

W. K. GREGORY,
Secretary pro tem.

At the regular meeting of this section held at the American Museum of Natural History, May 9, 1910, Professor Bashford Dean presiding, the following papers were read:

Notes on the Insectivore Genus Tupaia and its Allies: W. K. GREGORY.

In 1904 Dr. W. D. Mathew interpreted the characters of many Eocene mammals of various orders as pointing to a common stem form of arboreal habits and structure. The oriental insectivore *Tupaia*, and its little known Bornean ally *Ptilocercus lowii*, serve to illustrate these characters in still living forms. They have a divergent but not yet opposable thumb and great

toe, their habits are chiefly arboreal and the diet insectivorous-frugivorous. *Tupaia* retains many skeletal features that were characteristic of Eocene unguiculates, *e. g.*, long humerus and femur, humerus with entepicondylar foramen, femur with third trochanter, radius and ulna and tibia and fibula separate, flexible carpus and tarsus, semiplantigrade, five-toed manus and pes with divergent digit 1, free centrale carpi, astragalus without trochlear keels and with a rounded head, vertebral formula C. 7, D. 13, L. 6 or 7, S. 3, Cd. 23-26—and many others. Other features distinctly foreshadow the primate type, *e. g.*, relatively large brain case, broad forehead, large, posteriorly closed orbits, and especially the structural details of the auditory bulla and ossicles, dentition and astragalus. In *Ptilocercus* the skull and dentition is even more distinctly lemuroid but the rest of the skeleton is unknown. It is of course possible that these lemuroid characters are entirely due to convergent evolution, but the provisional conclusion is that the Tupaiidae are descended from the Insectivore stock that gave rise to the primates. Attention was called to the resemblances between *Ptilocercus* and the lower jaw from the Bridger Eocene described by Mathew as *Entomolestes grangeri*. The only differences are such as frequently separate more generalized forms from their descendants.

Fourth Journey of Exploration in the South Seas: H. E. CRAMPTON.

The speaker gave a brief account of the new results obtained in the course of a journey of seven months' duration among the Society, Cook, New Zealand, Tongan, Samoan, Fiji and Hawaiian islands. The organisms forming the material of investigations were terrestrial snails of the genus *Partula*—a strictly Pacific group. The species differ when a comparison is made of forms occurring in neighboring but isolated valleys of one island, in different islands of the same group, and in different groups of islands. The uniform principle of distribution summarizing the observed facts is, that the degree of geographic proximity of any two comparable regions is correlated with the degree of biological differentiation of their species.

A description was given of two active volcanoes, namely, of Savaii in Samoa and Kilauea in Hawaii. Other older islands of volcanic nature were brought into relation with these examples, as later stages in the production of deeply-furrowed land masses like Tahiti, where conditions are such that isolated valley stations are found

to be the homes of separate colonies of snails. Regarding the relation of such islands to other weathered peaks like Borabora, to coral atolls and to islands of uplifted coral limestone like many examples in the Cook and Tonga groups, the Darwin-Dana doctrine was contrasted with the views of Agassiz. It was pointed out that the phenomena of distribution in the case of species of *Partula* gave unquestioned support to the Darwin-Dana doctrine of a major process of subsidence, although secondary sporadic examples of the reverse process of uplift may be demonstrated at different points of the South Pacific Ocean.

L. HUSSAKOFF,

Secretary

AMERICAN MUSEUM OF NATURAL HISTORY

THE PHILOSOPHICAL SOCIETY OF WASHINGTON

THE 680th meeting was held on May 7, 1910, President Woodward in the chair. Three papers were read.

A Method of Precision for Computing Square Roots of Numbers: DR. R. S. WOODWARD, of the Carnegie Institution of Washington.

This method depends on the identity

$$ab = \frac{1}{2}(a+b)^2 \{1 - (a-b/a+b)^2\}.$$

Let N be any positive number and write $N = ab$, wherein a and b are any two numbers whose product is N . Write also for brevity $x = (a-b/a+b)^2$.

Then

$$\begin{aligned}\sqrt{N} &= \sqrt{ab} = \frac{1}{2}(a+b)(1-x)^{\frac{1}{2}} \\ &= \frac{1}{2}(a+b)(1-\frac{1}{2}x - \frac{1}{8}x^2 - \dots).\end{aligned}$$

It is seen that if the numbers a and b are properly chosen the series in x will converge very rapidly. They may be so chosen in fact that a high order of precision will be attained from the expression

$$\frac{1}{2}(a+b)(1-\frac{1}{2}x).$$

It is seen also that the calculation by means of the latter formula will be simplified if a and b are so chosen that $(a-b)/(a+b)$ is the reciprocal of an integer n , or if $x^{-1} = n^2$. This applies especially in case N is one of the natural numbers 2, 3, 5, When n is an integer the following relations hold:

$$a^2 = N \cdot n + 1/n - 1, \quad b^2 = N \cdot n - 1/n + 1.$$

When the approximation is limited to the first term in x , the exact value of the remainder, or error of the calculation, is

$$-\frac{1}{2}(a+b)\{1-\frac{1}{2}x-(1-x)^{\frac{1}{2}}\},$$

and this is the same as

$$-\frac{1}{2}(a+b)(\frac{1}{8}x^2+\frac{1}{16}x^3+\dots).$$

The application of the process to the numbers 2, 3, 5 is illustrated by the following table of values:

<i>N</i>	<i>a</i>	<i>b</i>	$\frac{1}{2}(a+b)$	<i>x</i> ⁻¹
2	$\frac{20}{14}$	$\frac{14}{10}$	$\frac{99}{70}$	(99) ²
3	$\frac{14}{7}$	$\frac{10}{7}$	$\frac{97}{7}$	(97) ²
5	$\frac{7}{4}$	$\frac{10}{9}$	$\frac{161}{72}$	(161) ²

The simplicity and precision of the calculations required are shown by the figures given below for the number 2.

$$\begin{aligned} 99/70 &= 1.4142857143, \\ -1/2 \cdot 1/70 \cdot 1/99 &= -0.0000721501, \\ \text{Sum} = \sqrt{2} &= 1.4142135642, \\ \text{Error} &= -18. \end{aligned}$$

Halley's and other Comets: Professor ASAPH HALL, of the U. S. Naval Observatory.

The speaker gave some interesting points about Halley's comet, including the date of its reappearance, its physical appearance, its relative brightness and orbital elements. This comet has been surely identified back to the year 1066 and probably to a much earlier date. The supposed physical constitution of comets was discussed at some length. Among the other comets mentioned were Brook's, Swift's and Encke's. The orbits of most comets are parabolic, or nearly so. A number of planets have their own family of comets. Comet captures by planets and the perturbation effects of the sun and the planets were briefly discussed.

Is there an Emanation from a Magnetized Substance? L. A. BAUER, of the Carnegie Institution of Washington.

The purpose of the paper was mainly to direct attention to the fundamental assumptions which underlie our explanations of magnetic phenomena. The question was raised as to what evidences there may be for or against the hypothesis of a possible "emanation"—using that word in its most general sense, radiation, pulsation or emission—due to the presence of a magnetized substance so that the force exerted by the latter might, like electric force, be corpuscular in its nature. The corpuscles in magnetism might be atomic systems in which an electron is revolving about an inner nucleus consisting, for example, of

a positive ion, such as assumed by Righi for the formation of his so-called "magnetic rays." Righi calls his atomic system an electron-positive ion, and Thomson, who independently of Righi had occasion to consider the possibility of similar systems, termed them "doublets." Since the system creates an atomic magnetic field whose axis passes through the center of rotation of the electron and perpendicular to the plane of rotation the speaker suggested calling such systems "magnetons." These magnetons, carrying a free magnetic charge, if given a translational movement along the magnetic axis, will possess all the properties ascribed to the lines of magnetic force—the translational movement giving the tension along the lines of force and the centripetal acceleration of the revolving electron supplying the cross pressure.

Some results obtained by the speaker in connection with his careful weighings, in a wholly non-magnetic balance, of magnetized and unmagnetized substances, led him to consider the hypothesis of a mechanical force being exerted on a magnet by the outside medium due to a possible emanation or pulsation of some kind from the magnet. Further experiments are to be made.

If the hypothesis as above set forth is correct we may look upon a magnetized substance as a source of "magneto-activity" just as a radioactive substance is of radioactivity.

(The abstracts of the first and third of the above mentioned papers are by their authors.)

R. L. FARIS,
Secretary

THE AMERICAN CHEMICAL SOCIETY NORTHEASTERN SECTION

THE ninety-eighth regular meeting of the section was held at the Twentieth Century Club, Boston, on April 29. Professor Henry Carmichael presented a paper entitled "Electrolysis of Chlorides Theoretically Considered," in which he described the advantages of a partition of asbestos cloth impregnated with portland cement, as a means of separating the electrode products in the analysis of brine. Mr. Jasper Whiting, in a paper upon "The Electrolysis of Brine," described in detail his electrolytic cell which makes use of the formation of sodium amalgam but is not open to many disadvantages possessed by the "Castner process."

K. L. MARK,
Secretary